Pest Alert

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State and Private Forestry
Northeastern Area

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Sudden Oak Death Caused by a New Species, Phytophthora ramorum

Tens of thousands of tanoak (*Lithocarpus densiflorus*), coast live oak (*Quercus agrifolia*), California black oak (*Quercus kelloggii*), Shreve oak (*Quercus parvula var. shrevei*), and madrone (*Arbutus menziesii*) have been killed by a newly identified species, *Phytophthora ramorum*, which causes Sudden Oak Death. Sudden Oak Death was first reported in 1995 in central coastal California. The pathogen also infects rhododendrons (*Rhododendron spp*.), huckleberry (*Vaccinium ovatum*), bay laurel (*Umbellularia californica*), California buckeye (*Aesculus californica*), and other tree and shrub species, but usually causes only leaf spots and twig dieback on these hosts. The host list is expected to expand as Dr. David Rizzo, University of California at Davis, and Dr. Matteo Garbelotto, University of California at Berkeley, continue their investigations of affected ecosystems.

Tree mortality caused by *Phytophthora ramorum*.

The disease is widespread in coastal California and is found commonly in two forest types: in the understory of coast redwood (*Sequoia sempervirens*) forests on tanoak; and in coastal evergreen forests on oaks, madrone (*Arbutus manziesii*), bay laurel, and other species. In California, Southern Oak Death has been confirmed in scattered locations along the Pacific coast north of Monterey County. The pathogen has also been found on dying tanoak in coastal southern Oregon, just north of the California border. Marin and Santa Cruz counties are heavily infested, and dead and dying trees are common in the wildland interface in backyards, parks, and open-space greenbelts.

Symptoms and Impact

On oaks and tanoak, cankers are formed on the stems. Cankered trees may survive for one to several years, but once crown dieback begins, leaves often turn from green to pale yellow to brown within a few weeks.

Black or reddish ooze often bleeds from the cankers, staining the bark, as well as killing the mosses that grow on it. Bleeding ooze may be difficult to see if it has dried or has been washed off by rain.

Bleeding ooze from a canker on an oak.

Necrotic bark tissues surrounded by black zone lines are present under affected bark. Because these symptoms can also be caused by other Phytophthora species, laboratory tests must be done to confirm pathogen identity.

Black zone lines under diseased bark in oak.

Infected coast live oaks sometimes gradually lose their leaves and fade out slowly. If bleeding oaks and leaf

spots on bay laurel or other symptomatic hosts are adjacent to one another, the presence of Phytophthora ramorum is likely. Laboratory confirmation is needed, however, since many other pathogens cause similar symptoms.

Leaf and twig dieback symptoms in tanoak.

A range of crown symptoms in an infested forest.

On small tanoaks (less than 4 inches diameter at breast height) the first symptom may be a wilting of branch tips. The branch dies back and resprouts with multiple shoots. Eventually, the entire tree dies and resprouts from the base, but the new shoots die back as well.

The pathogen has been linked to tree mortality only for oaks in the red oak group and the related tanoak and madrone. It causes leaf spots and twig dieback in bay laurel and several other species, including rhododendron and huckleberry. Spore levels may build up rapidly on these hosts creating a reservoir of inoculum.

A common saprophytic fungus (*Hypoxylon thouarsianum*), ambrosia beetles (*Monarthrum* spp.), bark beetles (*Pseudopityophthorus* spp.), and other organisms often colonize infected trees.

Other Oak Disorders with Similar Symptoms

Sudden Oak Death can be confused with many other disorders of oaks. Oaks defoliated by insects may appear dead, but leaves usually reflush later in the season. Canker rots, slime flux, leaf scorch, root diseases, freeze damage, herbicide injury, and other ailments may be confused with this disease.

Leaf spots caused by *Phytophthora ramorum* on rhododendron. Leaf spot margins caused by this *Phytophthora* are often fuzzy, rather than sharply defined.

Other insects and fungi colonize diseased trees. These organisms attack trees weakened by many other agents and are not specific to trees killed by *Phytopthora ramorum.*

To report infected trees or to receive additional information, please contact your State or Federal forest health specialist. On the Internet, visit the Sudden Oak Death home page at: www.suddenoakdeath.org. To distinguish this new disease from diseases with similar appearance, visit www.na.fs.fed.us/SOD

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Prepared by: Susan Frankel, USDA Forest Service, Pacific Southwest Region, 1323 Club Drive, Vallejo, CA 94592